Current research

Metazoan phylogeny

The animal kingdom comprises 35-36 phyla. Each phylum has a unique bodyplan (or bauplan) not obviously related to that of any other, so the relationships between the phyla have long been obscure. Thirty-two of these phyla, named the Bilateria, have a bilaterian symmetry; the remaining having radial symmetry. The origin of this bilaterian symmetry from a radial ancestor, and the nature of the first bilaterian are probably the main unresolved questions in metazoan evolution. Over 150 years, morphologists and embriologists have proposed different hypothesis on the nature of this first bilaterian ancestor.

My research interests focus on this question, trying to elucidate by molecular work the nature of the first bilaterian, and understand how the bilaterian radiation took place. This is the goal of my phD project, which is being supervised by Prof. Jaume Baguñà and Dr. Marta Riutort, both at the Department of Genetics at the University of Barcelona in Spain.

The first attempt, an 18S rDNA based sequence work (Ruiz-Trillo et al, 1999, Ruiz-Trillo, 2001), showed two key points. Firstly, that metazoa are composed of three different bilaterian lineages: Deuterostomia, Ecdysozoa and Lophotrochozoa, corroborating previous rRNA based studies (such as those done by Aguinaldo et al. (1997) and Halanych et al. (1995) defining respectively Ecdysozoa and Lophotrochozoa). Secondly, that the platyhelminth group Acoela is the most basal extant bilaterian lineage distinct from the other platyhelminths, such that Platyhelminthes is not a monophyletic group. These results implied that the last common bilaterian ancestor was probably small, benthic, without segments or coelomic cavities.

Moreover, additional data from 18SrDNA and the mitochondrial genes *cox1* and *cob* from acoels and nemertodermatids (previously considered the sister group of acoels) corroborated the previous findings of acoels as a basal group, and showed nemertodermatids also as a basal group, branching just after the acoels. (Baguñà et al., Jondelius et al., 2001 in press and in revision). These are key findings, illustrating that acoels and nemertodermatids are instrumental for understanding the adquisition of bilaterian synapomorhies (mainly bilateral symmetry and presence of mesoderm) and the radiation of bilaterian lineages.

To further test the position of acoels and nemertodermatids we are searching for new, independent corroborative evidence, such as: a) sequencing new nuclear genes of acoels, nemertodermatids and other bilaterian lineages and b) sequencing, in collaboration with Dr. Jeffrey L. Boore, the whole mitochondrial genome of an acoel, a nemertodermatid and a rhabdithophoran platyhelminth.

References

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